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ABSTRACT

Seychelles Integrated Science (SIS), a 3-year laboratory-based science program for students (ages 11-15) in upper primary grades 7, 8, and 9, was developed from an extensive evaluation and modification of previous P7-P9 materials. This P9 SIS unit focuses on: (1) basic ecological and conservation concepts; (2) problems and complexities of environmental decision-making; (3) skills needed to carry out environmental field work; (4) the nature and consequences of environmental pollution; (5) development of positive attitudes toward conservation in Seychelles; (6) the role played by plants in providing food and oxygen for man and other animals; and (7) soil erosion and how it can be prevented. Provided for the unit is a student workbook and a set of teaching notes. The teaching notes include the general aims of the unit, and a lesson plan for each topic area. Each lesson plan includes a suggested time frame, a list of objectives, a list of equipment needed, and a suggested lesson format. This format includes suggestions for introducing the lesson, instructional strategies (emphasizing procedures for student activities), and evaluation methods. The student workbook includes procedures for completing the unit activities and a list of new words keyed to page numbers in the workbook. A conservation role playing exercise is also provided. (JN)

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seychelles integrated science

Unit 13

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TEACHING NOTES

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THE GOALS OF UNIT 13

The SIS programme has five major aims; namely to develop in the pupils ;

(1) The ability and willingness to look at and observe their surroundings and events in their surroundings objectively.

(2) The ability and willingness to use a logical and rational "scientific" approach to everyday life based on objective observation.

(3) A knowledge and understanding of scientific and natural phenomena and an ability to communicate with others about these.

(4) An ability and willingness to use and relate scientific knowledge and skills to everyday life.

(5) An awareness of the influence that science and technology have both on their everyday life and on the lives of other people, plants and animals.

Unit 13 Conserving Our Environment is the final unit of the entire three year programme and in it we bring together all five aims. The Unit introduces the pupils to the basic concepts in ecology and conservation. It develops in the pupils the elementary skills needed for fieldwork in these areas and introduces them to some of the problems and complexities we must face in making decisions about our environment.

The Unit has SEVEN main goals;

(1) To develop in the pupils an elementary understanding of the basic concepts of environmental biology (ecology).

(2) To develop in the pupils the basic skills needed to carry out fieldwork in the study of the environment.

(3) To make the pupils aware of the important role played by plants in providing food and oxygen for man and other animals.

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(4) To foster the pupils' critical awareness of pollution in our environment and to develop their understanding of what can be done to prevent pollution.

(5) To make the pupils aware of the damage done by soil erosion and to develop their understanding of how it can be prevented.

(6) To encourage the pupils to have a positive attitude towards conserving the environment in Seychelles.

(7) To make the pupils aware of some of the complexities involved in making decisions regarding conservation of the environment and of the need to interpret and evaluate qualitative and quantitative information before reaching a conclusion .

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LESSON

UNIT 13 TOPIC 1

THE WORLD AROUND US

TIME Two to three periods

OBJECTIVES At the end of the Topic the pupils should be able to ;

(1) explain in their own words that the the place where an animal or plant lives from day to day is its HABITAT.

(2) recall the names of THREE animals which live in different habitats.

(3) describe in three or four words the habitat of each of the three animals in (2). e.g. a shark lives in the salt water of the sea, the earthworm lives in the soil.

EQUIPMENT No equipment necessary.

SUGGESTED LESSON FORMAT

INTRODUCTION Tell the pupils that today they will be going for a walk to look at some of the different places where plants and animals live.

Introduce the word habitat to describe the place where an animal or plant lives. (Objective 1).

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ACTIVITY

Bring the pupils to at least THREE different (nearby) habitats - e.g. A stream or flooded ditch, an area under a large tree, overgrown bush, mangrove or sand dunes.

Ask the pupils to "spot" and point out as many different living things as they can in each habitat.

During the walk comment on where different things live within the habitat - on the leaves of trees, on the soil, in the soil etc.

After you have visited each habitat for 5 - 10 minutes ask the pupils to say what they have "seen" here. Allow one or two pupils to report on each of the habitats. For each one write a short list on the board of the different living things they saw there. Let the pupils tell you the names. [Use local or common names only]. (Objective 2).

Let the pupils write down the "names" of each habitat they have visited and then copy down the names of the different living things they saw in that habitat.

Finally write the name of one of the living things on the board and ask the pupils to "describe" its habitat. Do this for four or five different living things and get the pupils to name other things which live in that habitat (objective 3).

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LESSON

UNIT 13 TOPIC 2

A SIMPLE HABITAT

TIME About three periods.

OBJECTIVES At the end of the Topic the pupils should be able to

(1) use a thermometer to measure and then be able to calculate the variation in temperature in a puddle of water over a (forty minute) period.

(2) use chicken wire to measure and then be able to calculate the variation in (surface) area of a puddle over a (forty minute) period.

(3) Explain in their own words how the size of a puddle and the water in it may be affected by the sun and how the size may be affected by the rain.

EQUIPMENT Each pair or group of pupils will need

- a large beaker or basin of water (about 500 ml)
- a piece of chalk
- a piece of 'chicken wire' about 60 x 60 cm
- a metre stick or ruler
- a thermometer.

SUGGESTED LESSON FORMAT

INTRODUCTION	Revise the objectives for Topic 1. Tell the pupils that over the next few weeks they are going to be looking at the way plants and animals live in different habitats - to help them do this they are firstly going to learn how to study a habitat.
ACTIVITY	Let everyone read sections 2.1 and 2.2. Explain what you expect each group to do. Then organise the groups so that they have their equipment and know exactly where they are to work. Let one group explain again what they are to do and then let each group carry out the activity. You and the technician(s) should move around the groups helping where needed and checking on the work. When each group has taken its first reading for temperature and area - get them to record these and then bring the class back into the laboratory or classroom.
DISCUSSION & EVALUATION	Ask the groups to explain to you what they did and use these reports to write key words and phrases on the board. Each pupil should then write up a report on what they did and draw a table showing their first results. They should leave space to record their second set. After they have completed the write up bring the pupils back out to take their second readings. (Objectives 1 & 2). In the classroom discuss the results. Let the pupils explain what their results were and what they think they mean. In the discussion bring out the point that the sun has heated or warmed up the water in the puddle and may also have evaporated some of the water. Ask the pupils to suggest how these changes might affect an insect or small fish that was living in a puddle or ditch. Also ask how we could make the puddle bigger again and compare this with rain increasing the size of ponds and ditches. (Objective 3).

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LESSON

UNIT 13 TOPIC 3

LIFE IN AN AQUARIUM

TIME One to two periods.

OBJECTIVES At the end of the Topic the pupils should be able to :

(1) recall the names of two animals and one plant which live in an aquarium, e.g. Tilipia,snail and Canadian pond weed

(2) plan, carry out and record the results of an experiment to see what type of food ONE of the animals prefers.

EQUIPMENT For this topic you will need an aquarium with fish,plants and snails living in it. It should be set up AT LEAST two weeks prior to the pupils begining the Topic.

Each group will need an animal (fish) in a large beaker and some pieces of bread, rice and meat.For safety's sake, it may be better to carry out the activity in 3.1 in a large water trough or basin. In this way the waste food will not pollute the aquarium.

SUGGESTED LESSON FORMAT

INTRODUCTION Show the pupils the aquarium and tell them that you want them to name as many different living things as they can in this habitat. Allow each group two or three moments to look at it closely. Find out which group can name the greatest number of living things. Again use common names.

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ACTIVITY	Draw a sketch of the aquarium on the board and draw and name the different living things identified by the groups. Let the pupils copy this drawing into their books. (Objective 1). Select one of the animals - a fish or insect - and ask the pupils, "How could we find out what it likes to eat?" Allow each group a few moments for discussion. Then ask them to describe to you what they plan to do. When you are satisfied let the groups carry out their activity.
DISCUSSION & EVALUATION	Get each group to report to you individually on what they did and what happened. from their description write out a key word (or phrase) list and ask them to draw a diagram and write a few lines describing what they did and what happened. [Even if their results were inconclusive let them report on this]. (Objective 2)

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LESSON

UNIT 13 SUMMARY 1

A STABLE COMMUNITY

TIME Two to three periods.

OBJECTIVES At the end of the lesson the pupils should

(1) know that during photosynthesis plants use carbon dioxide and give out oxygen

(2) be able to explain in their own words that if there were no plants in the world then after a short time there would be no oxygen for humans and other animals to breathe

(3) be able to explain in their own words that all animals depend on plants for their food - either directly by eating plants, or indirectly by eating other animals which eat plants

(4) be able to explain in their own words that plants need minerals to grow and that these can be produced by microbes from the waste of animals

(5) know that a group of living things sharing a habitat is called a community.

EQUIPMENT You will need to have the aquarium available for the pupils to look at while discussing Sections 2 & 3.

Each pupil should also have a sheet of "Stable Community" cards and the use of scissors.

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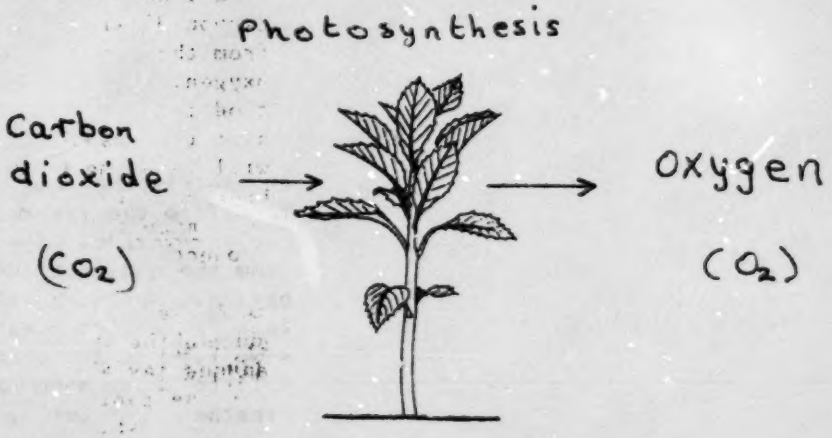
SUGGESTED LESSON FORMAT

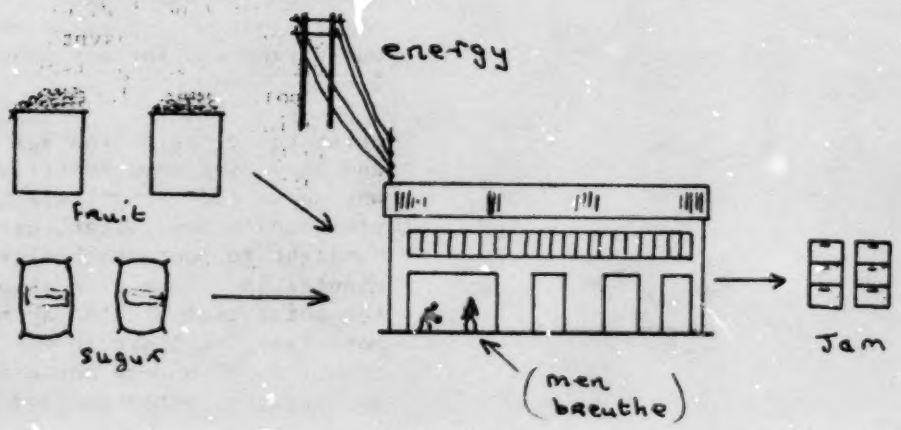
INTRODUCTION

Write the word PHOTOSYNTHESIS on the board. Tell the pupils that "we met this word before in Unit 7" and ask if anyone can tell you what they remember about photosynthesis.

From Unit 7 the pupils should remember that plants need air, light and water in order to photosynthesise- make food. In the discussion ask "what part of the air" do plants need to <u>make</u> their food and bring out the point during photosynthesis plants take in carbon dioxide and give out oxygen. (Objective 1).



In A & B streams some pupils may bring up the point from Unit 5 that a plant is a living thing and "breathes" in oxygen. Confirm that this is correct but that during daylight plants will breathe <u>and at the same time</u> make food. You can compare it to a food processing plant, such



RAW MATERIALS + ENERGY ⟶ PRODUCTS

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as National Agro-Industries Limited (NAIL). The factory takes in the raw materials of fruit and sugar and uses electrical energy to work the machinery and make jam. Inside the factory the men and women breathe in oxygen and give out carbon dioxide while they are making the jam.

In exactly the same way plants make their food from the raw materials of water and carbon dioxide. They get their energy from the sunlight and make starch and oxygen. While the plant is making its food it is also breathing so that at the same time as it is making oxygen the plant will be using some oxygen from the air to breathe. But during the day plants produce much more oxygen than they use. (Objective 1).

Tell the pupils that without plants everyone in the world would soon die. Ask can anyone say why - but allow a few minutes for the pupils to discuss it with each other first. Allow the pupils to report and from the discussion bring out the points that we depend on plants both for our oxygen and for our food. (Objectives 2 & 3).

Bring the class to the agriculture project and show them some fertilizer. Ask them why do we add fertilizers to the soil if plants only need water, carbon dioxide and sunlight to photosynthesise. Allow a few minutes for group discussion. Bring out the point that plants may need only those materials for their food - but for them to grow they also need certain minerals such as nitrogen, potassium and phosphorus.

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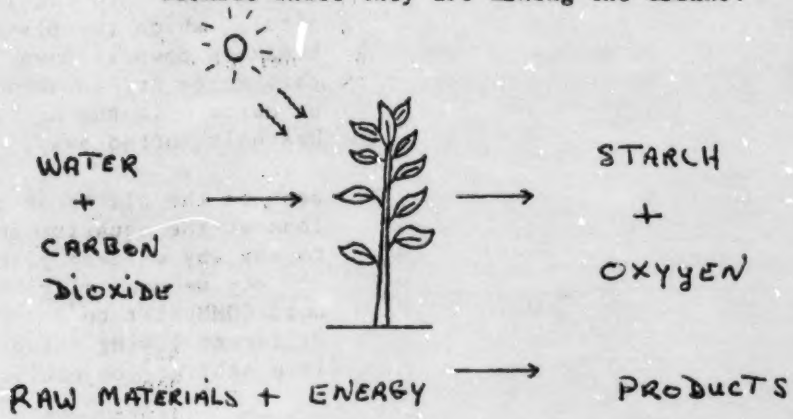
The factory takes in the raw materials of sugar, water and flavourings and uses electrical energy to work the machinery and make Sport, Cola, Orange, etc. Inside the factory the men and women who work there breathe in oxygen and give out carbon dioxide while they are making the ~~drinks~~.



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Explain that in the agriculture project we add the minerals to the soil but in nature the plants get the minerals from the waste of animals and leaves and roots of other plants - but that firstly the 'bodies' and 'waste' have to be broken down into the fine pieces of mineral which the plants can use. This breaking down is down by microbes. At this stage try to show a fruit, vegetable or carcase in the agriculture plot which has half rotted away. (Objective 4).

Back in the classroom get the pupils to look at the aquarium and ask one or two to say why we need plants in the aquarium and why we need microbes. Introduce the word COMMUNITY to describe a group of different living things living together in a habitat (objective 5)

DISCUSSION AND EVALUATION

Draw a diagram of the community in an aquarium. Ask the pupils to explain how all living things - plants, fish and microbes need each other. Use their explanations to write key words and phrases on the board and then get each pupil to draw the community and to write up a short report on it. As each person finishes this appoint him or her to a group. Explain to each group how to play "STABLE COMMUNITY" and then allow them 20 to 30 minutes to play the game.

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LESSON

UNIT 13 PROJECT 1

INVESTIGATING A HABITAT

TIME Three to four periods

OBJECTIVES At the end of the project the pupils should, for the particular habitat they have VISITED and studied, be able to:

(1) write two to three lines describing the habitat

(2) take and record measurements of the temperature and area of the habitat

(3) recall the (common) names of at least THREE plants and TWO animals which live in the habitat

(4) construct and draw a food chain involving two animals and a plant which live in the habitat.

EQUIPMENT Each pair or group of pupils will need

- some chicken wire (from Topic 2)
- a metre stick or ruler
- a thermometer
- a beaker or clear plastic box

Choose a habitat which is within easy walking distance of the school and yet will allow all the groups to study an area of their own. Suitable areas for study would be -- a pond, a stream or flooded ditch, a rock pool, a mangrove swamp, the litter layer underneath a large tree. The Science Section has background materials for teachers on a number of different habitats in Seychelles. Check with the Section to see if they can help.

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SUGGESTED LESSON FORMAT

INTRODUCTION

Tell the pupils that today they will be studying how things live and grow in a particular habitat. Ask them to read Sections 1 - 5 of Project 1. Then ask each group to "plan" exactly what they are going to do.

Check that each group is clear on what to do and has the equipment they will need. Then bring the class to the habitat area you have selected. Spread the group out so that each has a small area - of its own - to study.

Each group should

- write a short description of the habitat
- measure and record the temperature and area of their section or 'sample' area
- prepare a list of all the different plants and animals in their section
- try to identify what each animal type in the area eats
- draw a diagram or sketch of the group's section showing where they found the different plants and animals (Objectives 1, 2 & 3).

DISCUSSION & EVALUATION

You and the technician(s) should move from group to group guiding and where needed helping them to identify their plants and animals.

[If you do not know the name of a particular plant or animal do not be afraid to say so to the pupils. Let the pupils call it plant X or Y and say that they can "look it up" when they return to the laboratory.]

Back in the laboratory try to identify all the plants brought in by the pupils. Help <u>them</u> to use reference sheets and drawings if need be. But remember we are only interested in the <u>common</u> names.

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Discuss what the different animals eat and from the discussion draw a food chain on the board involving two animals and a plant from the habitat. (Objective 4).

Get each pupil to prepare a food chain for the animals they found in their area.

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LESSON

UNIT 13 TOPIC 4

INVESTIGATING COCKROACHES

TIME Three to four periods

OBJECTIVES At the end of the Topic the pupils should be able to

(1) explain in their words that we use the word ENVIRONMENT to describe the the complete range of things which affect a living thing's life - temperature, light, food, water and other living things

(2) identify on a cockroach or a drawing of a cockroach the head, wings antenna and (six) jointed legs

(3) design and carry out an experiment to see what things a cockroach will and will not eat

(4) explain in their own words that cockroaches can spread disease by carrying germs from rubbish and decaying matter onto our food.

EQUIPMENT Each group of pupils will need

- a cockroach
- a cardboard box
- a cover for the box (a clear plastic bag or sheet)
- some pieces of different types of "food" (meat, fish, bread, rice) and some indigestable items (cloth, plastic, rubber and cement).

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SUGGESTED LESSON FORMAT

INTRODUCTION

Write the word habitat on the board and ask some of the pupils to explain what we mean by a habitat (Topic 1 objective 1).

Explain that within a habitat there are many things which could affect how well an animal or plant can live. Remind the pupils of one of the animals from the habitat they studied in Project 1 and ask them to name three or four things which could affect its life. Allow a few minutes for the pupils to discuss it amongst themselves and then get a few to report their ideas to the class. In the discussion bring out the importance of weather, temperature and the presence of other plants and animals. Introduce the word ENVIRONMENT to explain the complete range of external conditions under which the organism lives (objective 1).

ACTIVITY

Ask the pupils if they can tell you where to find some cockroaches. Question their answers - for example if they say in a dark cupboard, ask if cockroaches only live in the dark. From the discussion draw up on the board a list of places where we find cockroaches. Bring out the point that cockroaches can live under a wide range of different conditions. They can accept a lot of changes in their environment.

Get each group to "look at" a cockroach - in a covered jar - carefully. Then let them use the diagram to identify the head, wings, antenna and jointed legs.

Get each pupil to draw a diagram of a cockroach into his/her book and to label these parts.

Let the pupils read Section 4.2. Make sure that everyone is aware that they are only to touch the cockroach gently and are NOT to harm or tease it.

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Discuss what the cockroach does to protect itself. Suggestions might include

- flys or runs fast to escape
- hides in a dark corner or on a dark wall or cupboard
- stays very still so as not to attract attention.

Allow the pupils to read Section 4.3. Ask them to plan their experiment. Then let each group discuss it with you. When you are satisfied let the group begin.

DISCUSSION AND EVALUATION

As each group finishes discuss their results with them and in the discussion bring out the point that being able to eat a wide range of food helps the cockroach to survive in a lot of different places. It can survive in a wide range of environments.

Get the pupils to look at the picture on page 8. Ask what else would live in or on this rubbish. From the discussion bring out the point that the cockroach "shares" a habitat with rats, mice and microbes which can all cause or spread diseases. Yet the cockroach also moves in and shares the habitat inside our home. It can carry microbes from the rubbish and so spread disease to man.

Ask the pupils to suggest what we should do to prevent cockroaches spreading disease (objective 4).

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LESSON

UNIT 13 TOPIC 5

OUR ENVIRONMENT AND POLLUTION

TIME Two to three periods

OBJECTIVES At the end of the topic the pupils should be able to;

(1) explain in their own words that some rubbish is biodegradable * ,i.e. can be broken down by living things such as small animals and microbes,but some rubbish is not biodegradable*

(2) recall TWO examples of materials which are biodegradable* and TWO examples of materials which are not.

* pupils do not necessarily need to know the word biodegradable.

(3) give THREE examples of how "rubbish" can pollute the environment in Seychelles, e.g. disgarded metal, glass and plastic goods-such as cars, cans,bottles,cartons and bags - human faeces and urine - used industrial waste such as diesel and motor oil - oil and crude oil spilt from tankers and other ships.

(4) be able to recognize examples of pollution in their local environment.

EQUIPMENT No equipment needed.

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SUGGESTED LESSON FORMAT

INTRODUCTION

Let the pupils read Section 5.0. Then ask them to draw up a list of the ways in which we can damage our environment. Allow each group a few minutes for discussion and then let one person from the group report on the list.

Use the different suggestions to draw up your list on the board.

ACTIVITY

Get each pupil to write the list into their book. One of the suggestions on your the list should be that we often pollute our environment by dumping rubbish and waste carelessly. Remind the pupils that some waste -such as dead plant material and human and animal faeces can be broken down by microbes to form minerals for plant growth. Then explain that other materials can not be broken down by microbes. Ask if they can think of any materials which are NOT broken down by microbes. Allow some discussion and make a list of materials with everyday examples.

metal - cans, cars, old fridges

glass - bottles, broken windows

plastic - bags, bottles, cartons

Brick/stone - from old walls and houses

Allow a few minutes for group discussion on how we should get rid of our rubbish and on what we should do to prevent pollution.
Let each group look at the pictures in Section 5.2. Ask them to identify what is happening in each and what could be done to prevent pollution in this cases. Allow five to ten minutes for the groups to discuss the pictures and to prepare a verbal report. Allow two or three groups to make a report about the first picture and from the discussion identifying what has or is happening and what should be done to prevent it happening again.

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Repeat this for the other three photographs.

In the discussion talk about household and industrial rubbish and waste being dumped into rivers, on the shore, and into the sea. Bring out the point that it is not only "rubbish" such as paper and plastic which can cause problems but old cars and machines and waste from industrial processes. Remind them that we all want energy in our homes but producing the energy also means producing waste. The power stations when they are producing electricity also produce a lot of waste oils and tar - what should we do with this waste ?

From the photograph of the ship lead on to the need to prevent pollution of the sea. Discuss the damage that can be done by people dumping things into the sea. Also mention the problem of large tankers transporting crude oil from one country to another. What might happen if one of the tankers runs aground or sinks?

DISCUSSION AND EVALUATION

Bring the class on a walk around the local neighbourhood. Ask them to look for examples of pollution. As an example is spotted ask the pupils,

What is wrong here ?
What would have been the right thing to do?
What can we do to encourage people to dispose of this "rubbish" correctly ?
(objectives 1 and 2)

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LESSON

UNIT 13 TOPIC 6

EROSION IN OUR ENVIRONMENT

TIME Two to three periods

OBJECTIVES At the end of the Topic the pupils should be able to ;

(1) explain in their own words that soil can be washed or blown away and that we call this type of damage EROSION.

(2) carry out and interpret the results of an experiment to investigate which of two soils will be eroded most easily - soil 'bound' with grass or uncovered soil.

(3) explain in their own words how fires and tree felling can cause soil erosion because they kill or remove the plants covering the soil and so allow it to be eroded more easily.

EQUIPMENT You will need the set of two slides showing soil erosion.One shows erosion on Praslin and the second shows an area in Nigeria where soil erosion has been allowed to continue for many years.

Each group of pupils will need

- two shallow trays (seed trays)
- some red soil*
- a tuft of grass with soil attached*
- a large jar or beaker
- use of a watering can

* enough to fill the shallow trays

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SUGGESTED LESSON FORMAT

INTRODUCTION

Show the slides of Praslin where soil erosion has taken place. Ask the pupils what are the "red" areas in amongst the trees and why are there no plants or trees growing in those areas.

From the discussion bring out the point that the soil which the plants need to grow on has been "washed" or blown away from these areas. Introduce the word EROSION to explain the loss of soil in this way.Then use the slide of soil erosion in Nigeria to show what can happen if erosion is not prevented.

ACTIVITY

Explain that today the class is going to carry out an experiment to invetsigate how we can prevent soil erosion. Get everyone to read Sections 6.1 and 6.2. Allow each group a few minutes to discuss what they are going to do and then get one group to report to the others on how they propose to carry out the experiment. When you are sure everyone is clear about what to do let them carry out the activity.

DISCUSSION AND EVALUATION

Ask each group to prepare a verbal report on what they did and what they found out. Let two or three groups present their reports to the class. Write key words or phrases from the reports on the board and then get each pupil to write up their own report of the experiment using these key words and phrases (objective 2)

Show the slides of soil erosion on Praslin again. Discuss what caused this erosion - fires and tree felling. Then discuss the importance of preventing fires and of replacing any trees that we do cut down.

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LESSON

UNIT 13 SUMMARY 2

CONSERVING OUR ENVIRONMENT

TIME Four to five periods

OBJECTIVES At the end of the Summary the pupils should be able to;

(1) explain in their own words THREE reasons why we should help conserve the environment in Seychelles

(2) recall FOUR things which the people and government of Seychelles are already doing to help conserve our environment

(3) interpret information presented in a role play exercise and reach an informed decision as to whether or not the charcoal factory in the exercise should be built.

EQUIPMENT You will need a set of "CHARCOAL FACTORY" role play sheets. They are available from the Distribution Unit of the Ministry of Education.

Each pair of pupils should have a large sheet of paper for a POSTER and either paints or coloured markers.

SUGGESTED LESSON FORMAT

INTRODUCTION Let the pupils read Section 1. Discuss with them some of the reasons why tourists come to visit Seychelles e.g

- the clean beaches, the clear sea and the sunshine.

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ACTIVITY

Ask why it is important to conserve our environment. Allow five to ten minutes for the pupils to discuss and list THREE reasons why they think we should conserve the environment.

e.g. - it is healthier for us

- it is more pleasant

- it encourages tourists and so helps the economy

- it helps preserve special animals and plants which otherwise may die out.

Let each group report and then you should draw up a list on the board using the pupils' own words.

Each pupils should then write this into his or her book.

Let the pupils read the newspaper report of the speech by Dr Ferrari. Allow each group a few minutes to discuss it and to select FOUR things which we are already doing to help conservation in Seychelles. Allow two or three groups to present their results. Again summarize these on the board using the pupils' own words and then get each pupil to write them down (objective 2).

DISCUSSION AND EVALUATION

Give out the sheets on the 'Charcoal Factory Project'. Select who is to play each role and explain carefully how the exercise is to be carried out. Make it clear that the pupils are NOT to present their own views but are to give the views and arguments that they think the person they are acting would give. Allow 15 - 20 minutes for the pupils to prepare for their role and then allow about 30 minutes for the role play itself. Afterwards take a vote of all the members of the class who have not played a role as to

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whether or not they think the factory should be built. You should also allow two or three people to 'speak from the floor' on why they voted the way they did (objective 3).

Finally get each pair of pupils to design and draw a poster which could be used to encourage people to conserve the environment in Seychelles.

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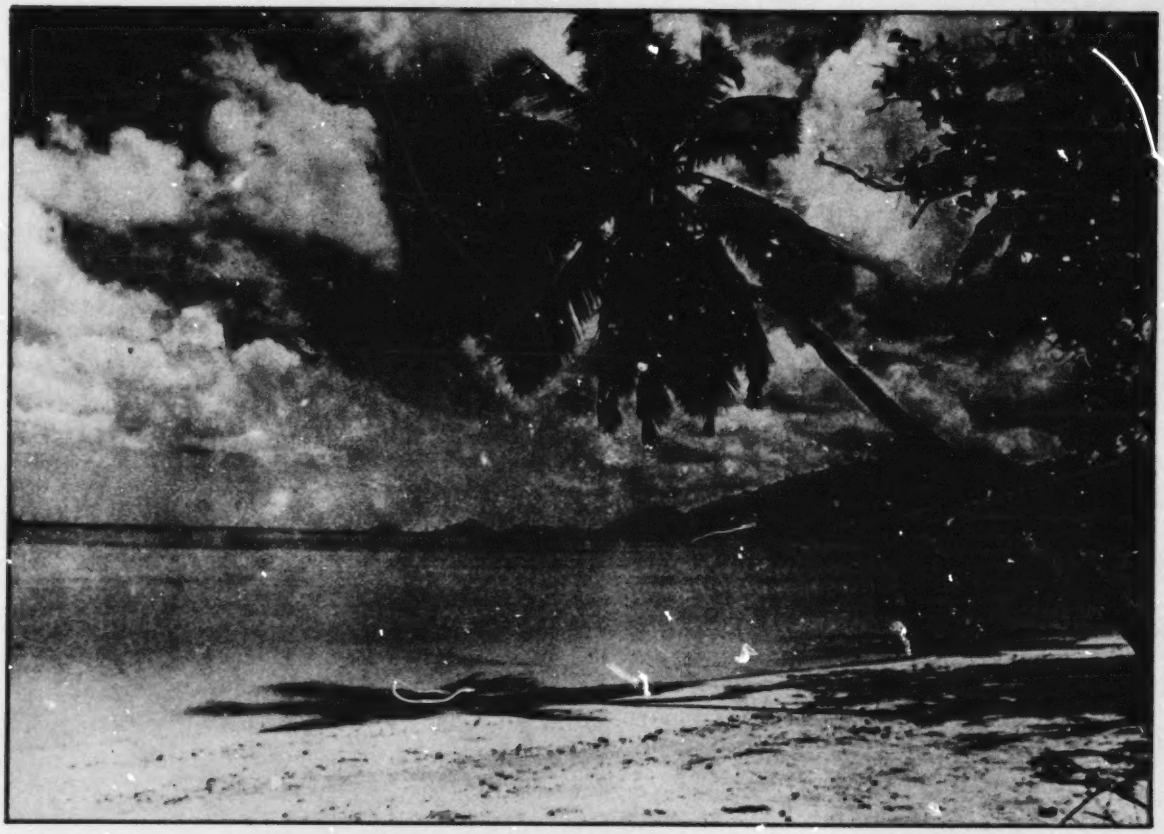
SEYCHELLES INTEGRATED SCIENCE

Unit 13



SE045072

CONSERVING OUR ENVIRONMENT

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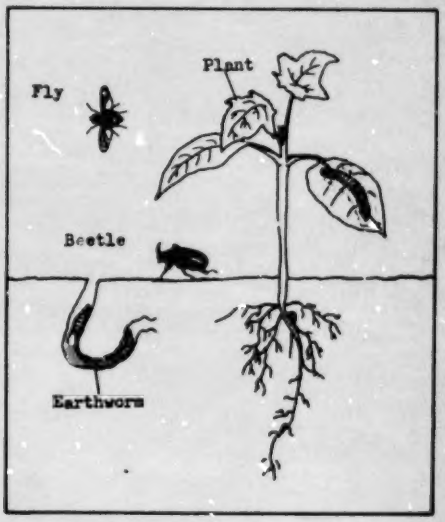
UNIT 13

TOPIC 1

THE WORLD AROUND US

1.0 In this unit we are going to try to discover more about the world in which we live. First of all let us go for a walk and look at some of the things that live around us. On your walk write down the names of all the different living things that you see.

1.1 When you have written down the names of about twenty different living things compare your list with your friend's..



Do all the things on your list live on the land? You may find that some things live in water, the salt water of the sea, or the fresh water of a river or stream. Some things, such as beetles and spiders may live on top of the soil, while others such as earthworms, may live in the soil. We call the place where an animal or plant lives from day to day, its **HABITAT**.

Look again at your list of animals and plants. Pick out THREE and write a few words about the habitats of each of them.

You and other people also have a habitat where you live from day to day. Write one or two lines to describe your own habitat. Compare what you have written with that of your friends. Are they the same?

UNIT 13

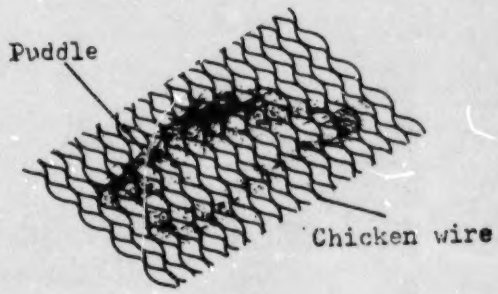
TOPIC 2

A SIMPLE HABITAT

2.0 It is not easy for us to study the habitats we looked at in Topic 1 because there are so many different animals and plants living in them. First we are going to look at some of the changes that occur in a very simple habitat.

2.1 Put about 500 ml of water into a large container. Pour it onto some flat concrete to make a "puddle" of water. (This represents a simple habitat, such as a mosquito larva could live in).

Measure and record the temperature of the water in your puddle. Then draw a line with a piece of chalk on the concrete around the edge of the puddle. Use a ruler and some chicken wire to help you to measure the AREA or size of the puddle.



2.2 In your book describe how you measured the size of the puddle. Discuss what you would expect to happen to its size in sunny weather, in windy weather and in rainy weather. Now go and measure the temperature and the size of the puddle again. Describe and explain any differences between these measurements and the ones you made in 2.1.

2.3 How do you think these changes might affect something living in the puddle ?

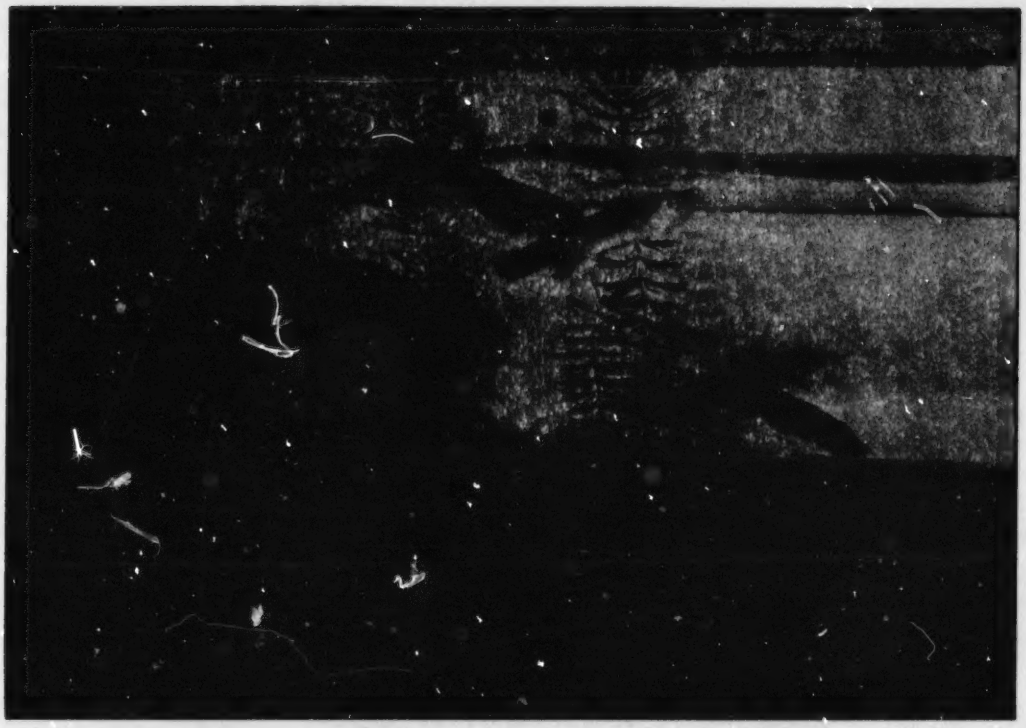
UNIT 13

TOPIC 3

LIFE IN AN AQUARIUM

3.0 The puddle we studied in Topic 2 was very simple. It was not a real habitat because there was nothing living in it. Now let us look at a real "habitat" an aquarium, something which does have living things in it.

3.1



Our aquarium is not a true "natural" habitat. We must give food to the animals, and we may have to put air into the water.
Discuss with your friends what sort of food the animals prefer. Plan an experiment to find out if they prefer bread and rice or bits of meat.

Describe the experiment that you do and record the results that you get

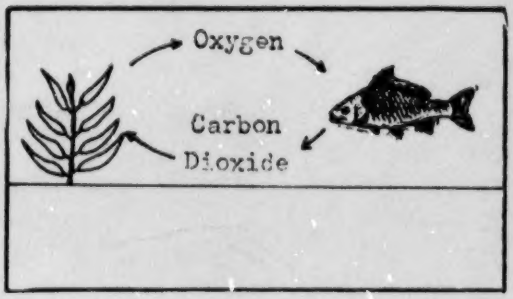
UNIT 13

SUMMARY 1

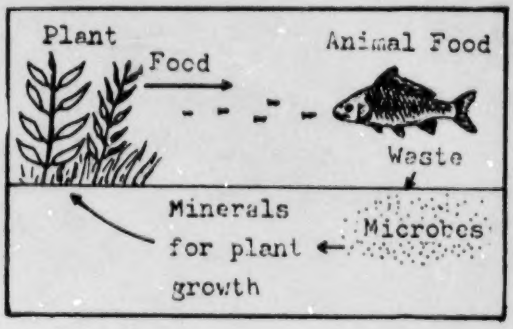
A STABLE COMMUNITY

1 In a true natural habitat a number of different plants, microbes and animals live together. They all depend on each other in different ways.

2 When plants make their food by PHOTOSYNTHESIS they also make OXYGEN. The animals need this oxygen to breathe. In turn, the animals breathe out CARBON DIOXIDE, which the plants need for photosynthesis.



3 The animals depend on the plants ; either they eat plants, or they eat other animals that eat plants. The plants need the waste (faeces and urine) that the animals produce. The microbes help to break down this waste so that the plants can use it.



4 A group of things living together like this is called a COMMUNITY. We say that the community is STABLE if everything in it gets all that it needs to live. There is a card game you can play with four other friends, called STABLE COMMUNITY. To win the game you must try to get 3 "PLANT" cards 1 "MICROBE" card and 1 "FISH" card.

To play, deal each person 5 cards and put the rest in a pile on the table (face down). Put down one card under the pile and take another from the top. The next player does the same until someone gets a "STABLE COMMUNITY".

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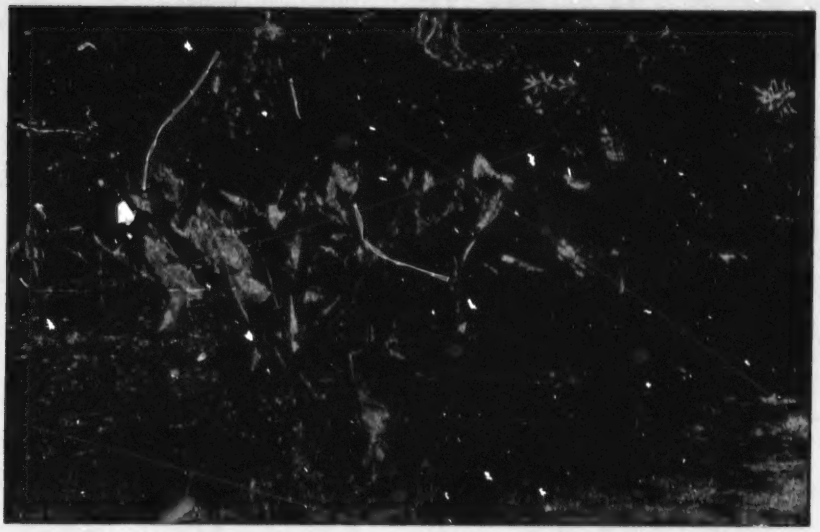
UNIT 13

PROJECT 1

INVESTIGATING A HABITAT

1 In Topics 1 - 3 and in Summary 1 we learned what a habitat is and how the weather can affect it. We also learned that the community of plants, animals and microbes that live in a habitat depend on each other. Now let's go outside and investigate a natural habitat somewhere near the school.



2 First, you should describe the habitat itself. For example, is it on land or in water ? How much shade or sunlight does it get during the day? What do the plants grow on ?

3 You should also try to measure the size of the habitat. Discuss with your friends how to do this. Write down what you do, and record the results that you get.

4 Next you should look carefully through every part of the habitat to find all of the different plants that grow there. Write a list of them in your book. Make a note of the plants that seem to be the most common, and those which are least common in your habitat.

UNIT 13

PROJECT 1

INVESTIGATING A HABITAT

5 Make a list of all the animals you have seen in the habitat. Write a few words for each animal to say where you found it. Try to find out as well what each animal eats. You should not try to catch the animals, or take them away, because this will disturb the community in the habitat.

6 Use what you have found out about the animals and plants in your habitat to write one or two "FOOD CHAINS". Your food chain should start with a plant and end with an animal. For example,

LIZARD
Eats grasshoppers

GRASS-HOPPER
Eats grass plants

GRASS PLANT
Food by photosynthesis

You may find that some animals eat more than one type of plant. You may also find that different animals will eat the same things.

UNIT 13

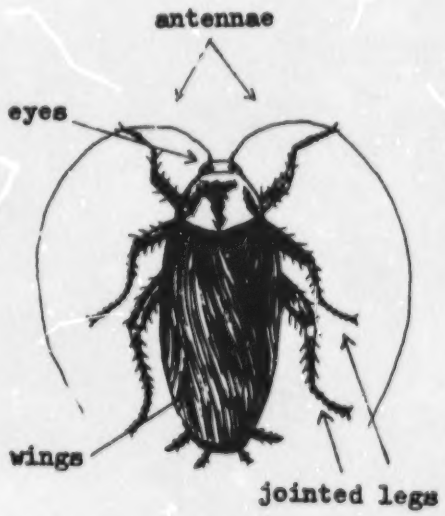
TOPIC 4

INVESTIGATING COCKROACHES

4.0 The life or death of a living thing does not depend only on where it lives, but also on everything else around it. We call this its ENVIRONMENT. To stay alive - or survive - an an animal or plant must manage to protect itself against enemies and tolerate changes in weather and temperature in its environment.

4.1 One animal that survive in many different environments is the cockroach. Collect some cockroaches and bring them to your science class. Make a list of the different places where you found the cockroaches.

Put your cockroach into a container, such as a glass beaker, and cover it so that it does not escape. Look carefully at its structure and draw a picture of it into your book. Use the diagram on the right to help you label your drawing.



4.2 Put the cockroach into the bottom of a cardboard box. Find out which parts of its body can sense when you touch it lightly with a pencil. Describe how it behaves when you touch it. How does this way of behaving help to protect it against enemies ?

UNIT 13

TOPIC 4

INVESTIGATING COCKROACHES

4.3 Some people say that cockroaches can eat almost anything. Discuss with your friends how you could find out (a) what they like to eat, and (b) something that they will NOT eat.

Describe in your book what you do. Record the results that you get. How do you think being able to eat many different things helps the cockroach to survive?

4.4 Because cockroaches can eat many different things, some of which we throw away as rubbish, they can also spread disease. Discuss with with your friends the best ways to get rid of rubbish so that we can control the spread of cockroaches and other pests.

UNIT 13

TOPIC 5

OUR ENVIRONMENT AND POLLUTION

5.0 People can live in many different environments because we CONTROL our environment . For example, we do not live in trees but we cut down the trees and use the wood to make houses. We do not just eat food that grows naturally around us but we grow our own crops and keep animals,like chickens, to eat. While we do some of these things to help us survive, we also do others which can cause unnecessary damage to our environment.

5.1 In Topic 4 we talked about the best ways of getting rid of rubbish. Now make a list of things that you and your family throw away as rubbish. Compare your list with your friend's. Which of these things can be eaten by small animals or microbes ?

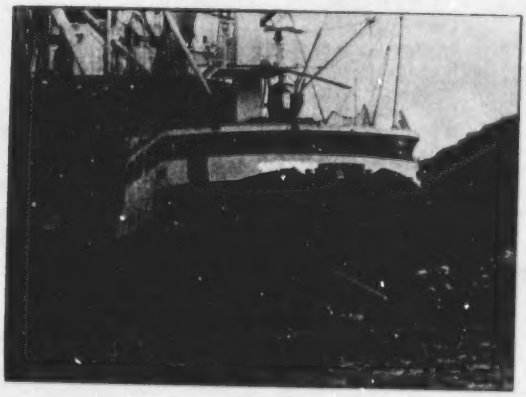
Discuss how this rubbish would affect the balance or equilibrium of a community living in the place where you throw it away.

UNIT 13

TOPIC 5

OUR ENVIRONMENT AND POLUTION

5.2 It is not only the land where we live that we make dirty, or POLLUTED. Look at the pictures below and describe what you can see in each of them.



Discuss how we could reduce the pollution that you can see in these pictures.

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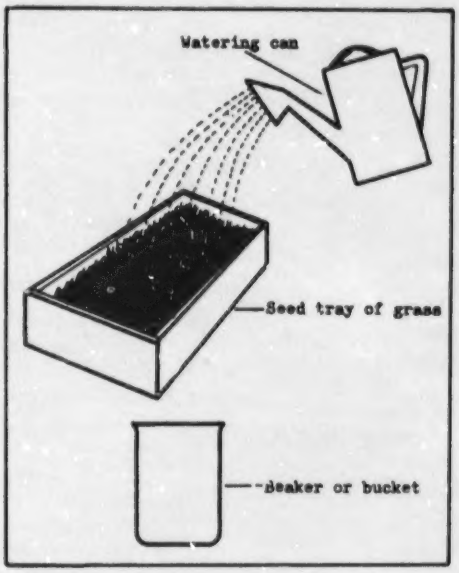
UNIT 13

TOPIC 6

EROSION IN OUR ENVIRONMENT

6.0 In Topic 5 we learned about one way in which people damage our environment : with rubbish and other forms of POLLUTION. However, people also damage our environment in other ways, sometimes without realizing it. For example, they may let the soil in an area be washed or blown away or become dried up. We call this type of damage EROSION of the soil.

6.1 Take two shallow trays of the same size. Fill one tray with red soil. Now find a place where grass grows well. Cut out a piece of soil about 6 to 8 cms thick with grass on it. Put it into the other tray. Support both trays so that they slope down to one corner. Hold a large jar or beaker under this corner.



Pour water from a watering can over the top of the soil in each tray and let it run into the beaker.

From which soil is there more erosion ? Discuss how we could stop water washing away or eroding soil in an area.

6.2 Leave both trays in the sun without watering for several hours. Which soil retains more water ? Which soil could be blown away more easily ?

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UNIT 13

SUMMARY 2

CONSERVING OUR ENVIRONMENT

1 We can damage our environment but if we are careful we can also look after the environment and protect it.

Here in Seychelles we should be very proud of our environment. Many beautiful and unusual plants and animals live and grow here. Tourists come from many parts of the world to see them and scientists come to study them. It is very important that we should try to CONSERVE our environment by keeping it as beautiful as it is

2 Why do you think it is important to conserve our environment ? Talk with your partner and try to give THREE reasons why it is worthwhile for YOU to help conserve the environment of Seychelles.

3 The government and people of Seychelles have already done a lot to conserve the environment. Read this report from the Nation of a talk given by Dr. Ferrari, the Minister For Planning and External Relations.

From the report can you name FOUR things which we have done in Seychelles to help conserve the environment ?

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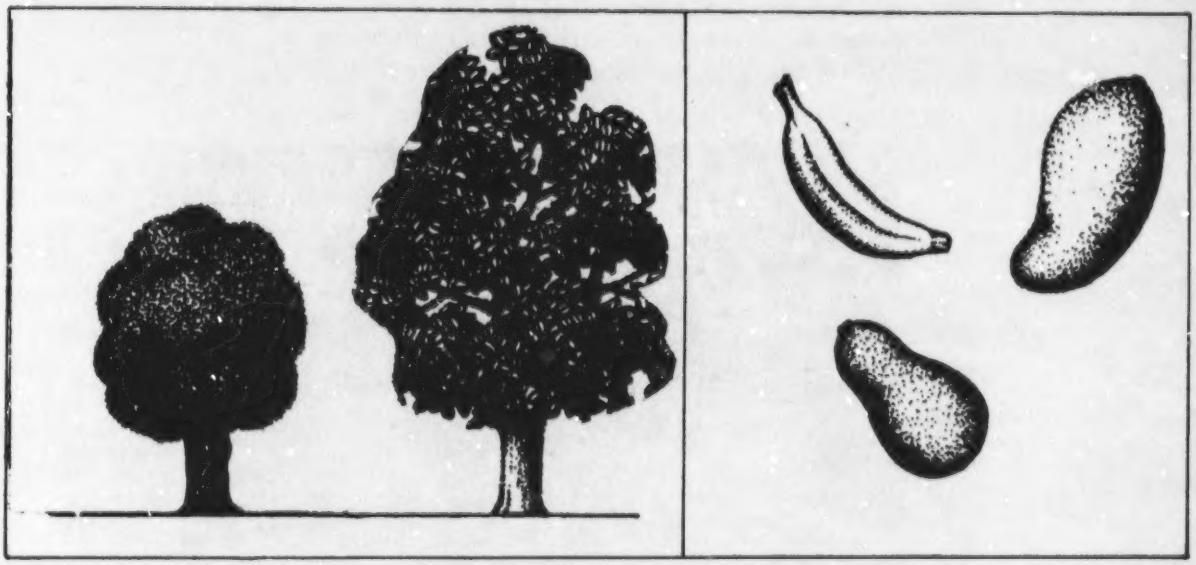
UNIT 13

SUMMARY 2

CONSERVING OUR ENVIRONMENT

4 Sometimes we are faced with difficult decisions to make about our environment. We need to grow our own food. Should we cut down more trees and clear the ground to grow food crops, or should we leave the trees and conserve the environment exactly as it is ?



5 To help you think and talk about one of these decisions or choices, we are going to ask some of you to act in a little play. It is a different type of play because you will have to help write it.

Your teacher will give out sheets about it and will select the people who will act in it.
The name of the play is THE NEW CHARCOAL FACTORY.

'Environmental protection is central to Seychelles' policies'

Environmental protection is one of the main themes of Seychelles' national and foreign policies, the Chairman of the National Environment Commission (SNEC), Dr. Maxime Ferrari, is explaining to conservationists in the United States this and next week.

Dr. Ferrari, the Minister for Planning and External Relations, is currently attending the 38th session of the United Nations General Assembly in New York, but will take time off to present lectures at the University of Miami in Florida and Harvard University in Boston.

The talks entitled "Protecting the Environment in Seychelles : Aspects and Objectives" are the same as that delivered in Washington last week in the Baird Auditorium of the National Museum of Natural History.

Precious inheritance

Using colour slides of geological formations, birds, animals and insects of Seychelles, Dr. Ferrari told members and associated of the very prestigious Smithsonian Institution that ". . . for the preservation of (our) precious inheritance and habitat, . . our Government has made environmental consideration a central theme of both our national and foreign policies.

"We are conscious that we must preserve ecosystems that have survived throughout the ages. It is our duty to make sure that our children and grand-children see and enjoy these natural wonders".

Nature reserves

Dr. Ferrari explained that Seychelles' conservation policies had two main objectives : the preservation of examples of natural habitats with the intention of opening them for recreational use and study to Seychellois, scientists and foreign visitors ; and the protection and careful use of natural resources to ensure that they remain a source of food and revenue.

The result was that over 40 per cent of Seychelles' total land mass of 444 square kilometres had been declared nature reserves or protected areas.

Seychelles was one of the first countries in the region to set up marine national parks, one of which, around the St. Anne group of islands, was very popular with tourists.

Since 1972, the use of spearguns for underwater fishing had been banned throughout the Republic, resulting in exceptionally tame and abundant fish life in the islands' lagoons.

Two of Seychelles' endemic birds, the Seychelles Brush Warbler and the Seychelles Black Paradise Flycatcher, had been brought back from the brink of extinction.

World Heritage Site

The giant Aldabra Atoll, which narrowly escaped being turned into an airbase by the British and American Governments, had been saved with the invaluable help of the Smithsonian Institution and the Royal Society of London and had finally been handed over to humanity as a Unesco World Heritage Site.

A whale sanctuary had been created in the Indian Ocean, establishing international and regional control over an area which was previously a plundering ground of all.

Most recently, the International Whaling Commission had formally adopted Seychelles' proposal for a gradual phasing out of all commercial whaling, leading to a total ban after 1986.

As Dr. Ferrari pointed out at the beginning of his lecture, Seychelles was small by any standard, but its size belied its stature in environmental matters.

Nevertheless, Seychelles' smallness in these arduous economic times made it difficult to find the resources to continue the research being carried out on unique Aldabra, Dr. Ferrari said. "Its future is still by no means assured", he cautioned.

The SNEC Chairman then finished his lecture, which included an explanation of the geology, flora and fauna of Seychelles and the origin of the country's conservation policies, with an appeal to scientific institutions, conservation organisations and other "friends" all over the world for continued international support for the cause of Aldabra.

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Stable	4
Tolerate	7

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THE CHARCOAL FACTORY PROJECT

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A Role Play Exercise for P9 Science

THE CHARCOAL FACTORY PROJECT

A Seychelles company wishes to build a factory for making charcoal. They propose to use local wood to make high quality charcoal which could be used both within Seychelles and sold for export. The new factory if it is built will employ 20 to 30 people to collect and cut the wood and to process it into charcoal. Some residents (people who live in the district) have objected to the plan to build the factory so the Government has asked the local SPPF Branch to hold a public meeting to discuss the project and report back to the Government on what the feelings of the local community are.

You are now going to "act out" the meeting. There will be nine (9) main actors. The rest of the class will play the part of the local residents who have come to hear about the project and , if they wish, to say what they feel about it.

If you are picked to be one of the main characters , remember you must act the role of that person. You are not to give your own views about the project; instead you are to present the views or OPINION of the person you are acting.

MAIN CHARACTERS

[1] R. GONSALVES

You are the local Branch Chairman and you have been asked by the Government to hold this public meeting. You want to be fair and just and want your community to hear both the good and the bad effects of the project. You allow each of the eight main speakers (four for the project and four against it) to speak for two to three minutes each. After that you will allow the other members of the class - who are acting as local residents- to speak one at a time. Again you wish to be fair and so you allow equal numbers of those "for " and "against" the project to speak but you only chose volunteers who wish to speak.

After all the speeches have been made you ask the residents to vote whether or not they want the Charcoal Factory to be built. You then announce to everyone what you will say in your report to the Government.

[2] J. DUBOIS

You are the chairman of the company which is proposing to set up the charcoal project. You have carried out a survey and found that there is a large market for exporting good charcoal. Charcoal is produced in small quantities in Seychelles at present but it is not of good enough quality for export. The charcoal you would make would be of very high quality and by selling it to other countries you would be gaining valuable foreign currency for Seychelles . If you get permission to build the factory the Development Bank of Seychelles will give you a loan and you will be able to employ between twenty and thirty local workers.

[3] B. DUFRENE

You support the idea of a charcoal factory. You own a section of land with a lot of trees on it. It is difficult to grow agriculture crops on your land and you get a poor yield of crops. If there was a charcoal factory it would be worthwhile for you to cut down the trees and sell them to the factory. You could use the profit both to plant new trees and to improve soil. With better soil you could grow food . You argue that the more food we grow locally the less we would have to import from overseas.

[4] M. POUPONNEAU

You are an unemployed worker living in the district. You earn a living by doing a little fishing and doing some agricultural work when you can get

it but you would like a full-time job. If the charcoal factory was built there would be a good opportunity for you to get a job. You support the project and argue that not only will it help you but it will help other families in the district. If the factory is built it will bring more business and more money into the district.

[5] W.BASTIENNE

You live in the district and you work at the Ministry of Planning and External Relations. You are not speaking for the Ministry but from your experience at work you feel that the project will be of great benefit to the district. You have seen how difficult it is to get projects which will provide jobs and you think that the people in the district would be foolish if they let this opportunity slip away . You also point out to the residents that by exporting charcoal the country will gain foreign currency which can be used to buy important foreign produce that we need for development - things such as medicines, seeds and fertilizers and machinery.

[6] B.BELLE

You work at the National Travel Agency (NTA) and met many tourists in your daily work. The district is one of the most beautiful on the island and many tourists visit it each year. They admire the trees and the animals and plants that live in and around them. You feel that if the charcoal factory is set up then there will be fewer trees and fewer plants and animals. The district will lose its beauty and its appeal to tourists. You oppose the project and argue that if the factory was built the district would lose not only its natural beauty but also the money that it gains from tourism.

[7] J.BENOIT

You are a farmer who owns the next section of land to B. Dufrene. There are few trees on your land and you worry that if the trees are removed from Dufrene's land then your soil will be eroded and damaged. Without the trees above your section you feel the heavy rains and the wind will wash and blow away your top soil. You are against the project and warn the other farmers that if the trees are cut down their soil will be damaged.

[8] M. CONSTANCE

You work at the Forestry Division and have seen in your work how some areas of Seychelles have been affected by soil erosion. You warn of what will happen to the soil if the tree shelter is removed. You have read about the serious problems of drought and famine which have occurred in parts of Kenya after large areas of forest were cleared of trees by charcoal burners and you warn of what could happen in the district if the factory was set up.

[9] F. SERVINA

You are a charcoal maker. For many years you have been making enough charcoal for the local market. You admit that the charcoal factory could make better quality charcoal than you can but you argue that your charcoal has always satisfied your customers and that it meets the local needs. You only make enough to satisfy the local market and so you do not do any serious or permanent damage to the environment. If the factory was built you would lose your job and serious damage could be caused to the environment . You ask the meeting, why should we risk this damage simply to satisfy foreigners' needs for charcoal. There is already enough charcoal for local needs.

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